The i-7531 CAN Repeater

User's Manual

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year from the date of delivery to the original purchaser.

Warning

ICP DAS assumes no liability for damages resulting from the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, or for any infringements of patents or other rights of third parties resulting from its use.

Copyright

Copyright 1997 by ICP DAS. All rights are reserved.

Trademark

The names used for identification only may be registered trademarks of their respective companies.

Tables of Content

Tables of Content 2
1 Introduction 3
1.1 Features 4
1.2 Specifications 4
1.3 Application 4
2 Hardware 5
2.1 Block Diagram 5
2.2 Appearance 6
2.3 Pin Assignment 7
2.4 Wire Connection 9
2.5 Status LED 10
2.6 Terminator resistor settings 10
2.7 Cable selection 12
3 Application architecture 13
4 Dimension and Mounting 14

1 Introduction

The i-7531 is a CAN repeaters used to establish a physical coupling of two or more segments of a CAN bus system. User can implement tree or star topologies as well as for long drop lines with i-7531. Connecting via i-7531, the division of a CAN system into several subsystems increases the maximum number of bus nodes.

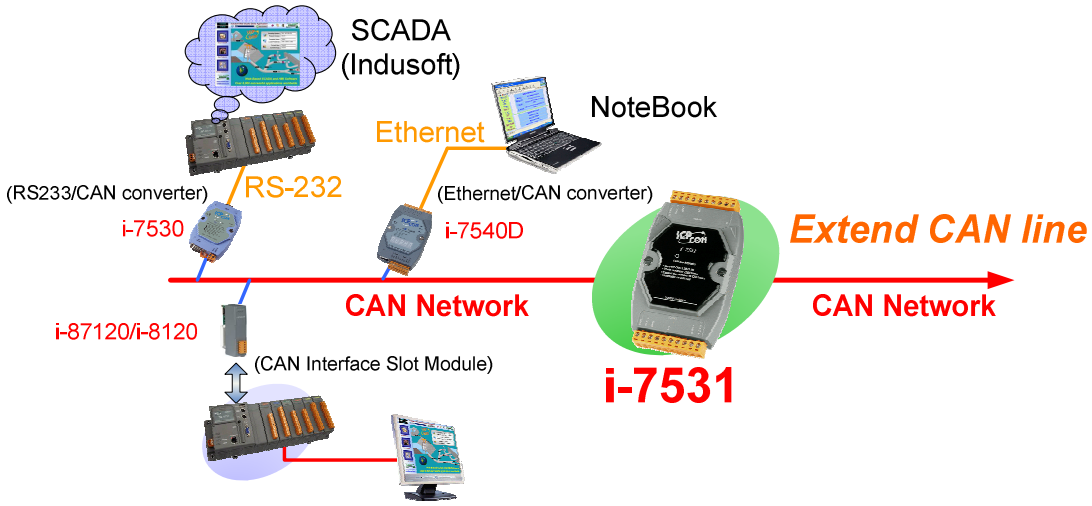


Figure1. Application of i-7531

The i-7531 is an optically isolated CAN repeater which provides 2500 Vrms of optical isolation allowing you to separate and protect critical segments of the system from the rest of the CAN network. And its galvanic isolation isolates both CAN segments from each other as well as from the power supply The CAN connection of i-7531 is by terminal blocks. A power supply of 10 ~ 30 DC voltage is required. The i-7531 is housed in a rugged DIN-Rail mountable box, making it easy to install in an industrial cabinet. Therefore, i-7531 can be used in CANopen, DeviceNet and generic ISO 11898-2 standard.

If user wants to know more detail information about the i-7531, please visit our website as follow:

http://www.icpdas.com/products/Remote_IO/can_bus/i-7531.htm

1.1 Features

- High speed (up to 1 Mbps)
- Removable terminal block
- Mountable on DIN Rail
- Bus pins protected against transients in an industrial environment
- No disturbance of the bus lines with an un-powered node
- Transmit data (TxD) dominant time-out function prevents the output drivers from driving a permanent dominant state
- A thermal protection circuit is integrated to prevent the transceiver from damage if the junction temperature exceeds thermal shutdown level.

1.2 Specifications

- Support CAN 2.0A/CAN 2.0B
- Fully compatible with the ISO 11898-2 standard
- Communication baud range : 10Kbps ~ 1Mbps
- Photo-coupler isolation between 2 CAN port: 2500 Vrms
- Power consumption: 2W max
- CAN terminal resistors are integrated (can be disabled by jumper)
- 3KV galvanic isolated among of power supply and each CAN port
- Power Supply: $+10V_{DC}$ ~ $+30V_{DC}$
- Operating temperature: -25℃ ~ +75℃
- Humidity: 5% ~ 95%
- Dimensions: 123 mm x 72 mm x 33 mm

1.3 Application

- Factory Automation
- Building Automation
- Home Automation
- Control system
- Monitor system
- Vehicle Automation
- …

2 Hardware

2.1 Block Diagram

Figure 2 is a block diagram illustrating the functions of the i-7531 module. It provides the 3000Vrms isolation in the CAN interface site. And photo-isolation 2500 Vrms between two CAN ports.

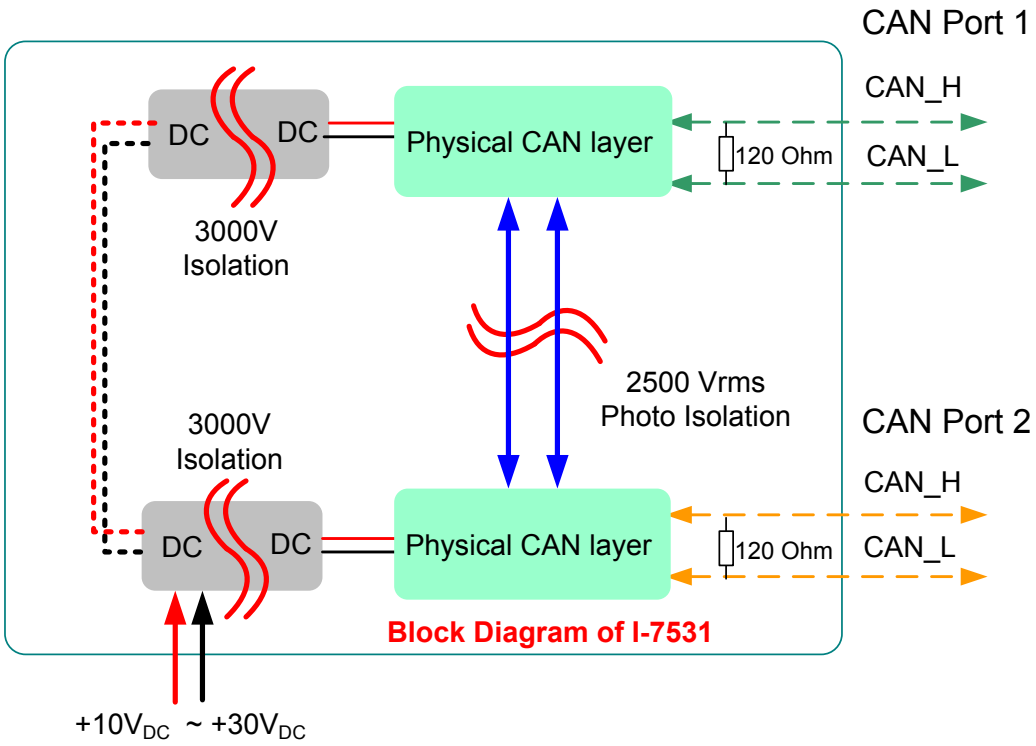


Figure2. Block diagram of i-7531

2.2 Appearance

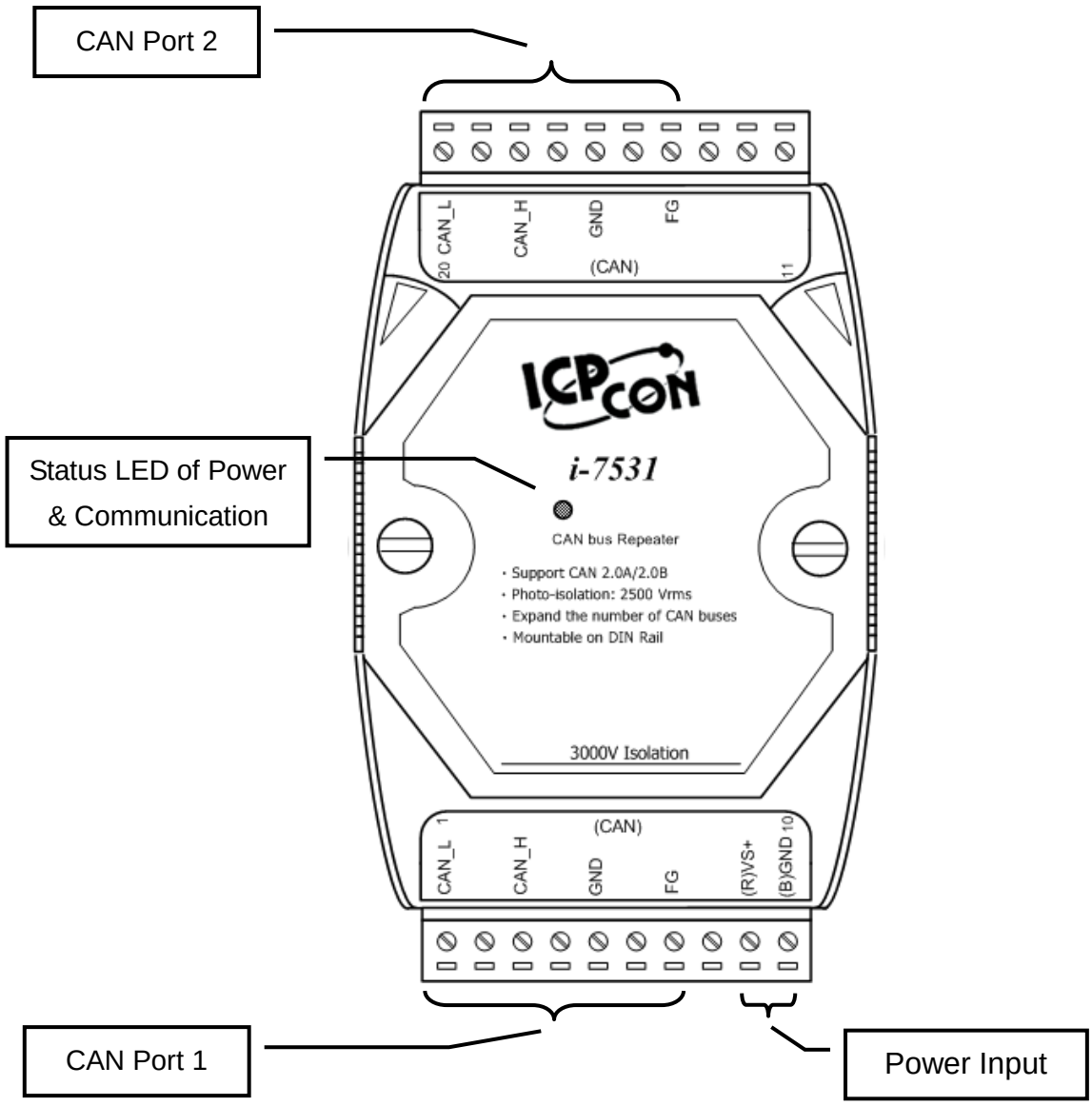


Figure3. Apperance of i-7531

2.3 Pin Assignment

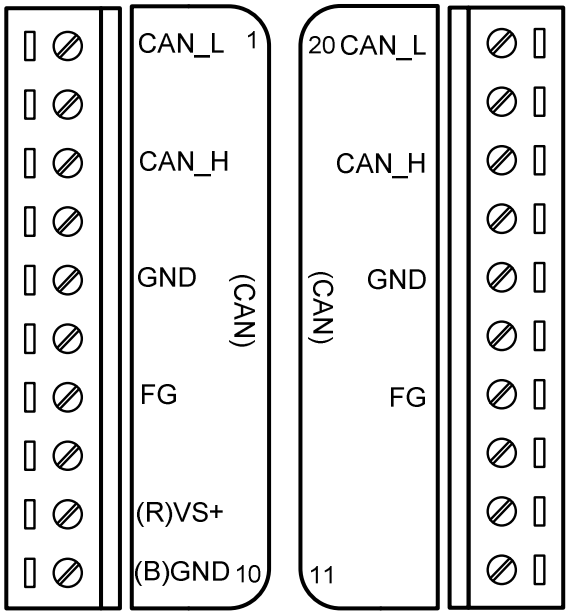


Figure4. Pin assignment of i-7531

Table1. Pin description of i-7531

No.	Part	Name	Description
1	CAN Port 1	CAN_L	CAN_Low. Signal Line of CAN port 1.
3		CAN_H	CAN_High. Signal Line of CAN port 1.
5		GND	CAN_Ground, Voltage level of ground of CAN_L and CAN_H of CAN port 1.
7		FG	Frame Groud (or CAN_Shield) of CAN port 1.
9	Power Input	(R)VS+	Voltage Source. It could be $+10V_{DC}$ ~ $+30V_{DC}$。
10		(B)GND	Power Ground.
14	CAN Port 2	CAN_L	CAN_Low. Signal Line of CAN port 2.
16		CAN_H	CAN_High. Signal Line of CAN port 2.
18		GND	CAN_Ground, Voltage level of ground of CAN_L and CAN_H of CAN port 2.
20		FG	Frame Groud (or CAN_Shield) of CAN port 2.

Note1: In some cases, the voltage level of CAN_Ground of different CAN device in the same CAN bus system are not equal. At this time, it could cause some problems to derogate system staibility of this CAN bus system.

There is one way to fix this problem; user can connect the CAN_Ground between those CAN devices to achieve equal voltage level of CAN_Ground.

Wiring of CAN_Ground is not necessary; user can modify the configuration of wiring according to actual applications.

Note2: If user usees some kinds of signal cable with shield (e.g. STP), then user can use the shield of this cable to connect FG (CAN_Shield) among different devices in the same CAN bus system.

FG (CAN_Shield) is used to shield the signal cable, to avoid RF radiation or other interference.

Wiring of FG is not necessary; user can modify the configuration of wiring according to actual applications.

2.4 Wire Connection

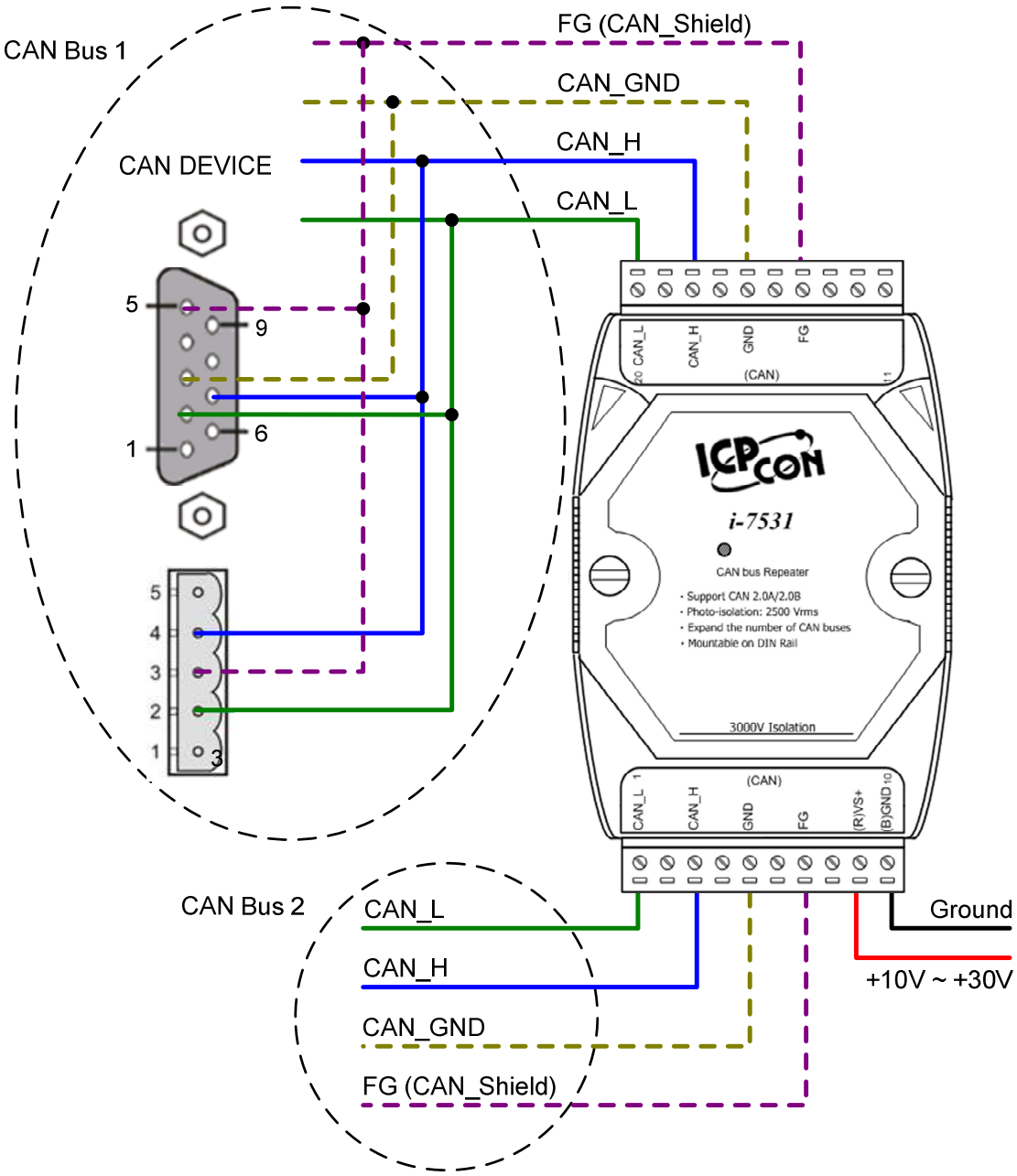


Figure5. Wire Connection of i-7531

2.5 Status LED

When the i-7531 is turned on, the status LED will be display with red light. Moreover, when a message passes through i-7531, the status LED will be twinkle once with yellow light while the red light is still on.

Note3: Twinkling rate correlates with baud rate of CAN bus. Users may see no twinkling when the twinkling period is too short because of the higher baud rate of CAN bus. Besides, the yellow LED could look like always on when bus loading is heavy.

2.6 Terminator Resistor Setting

According to the ISO 11898 specifications, the CAN bus network must be terminated by two termination resistor (120Ω) for proper operation, as shown in the below figure.

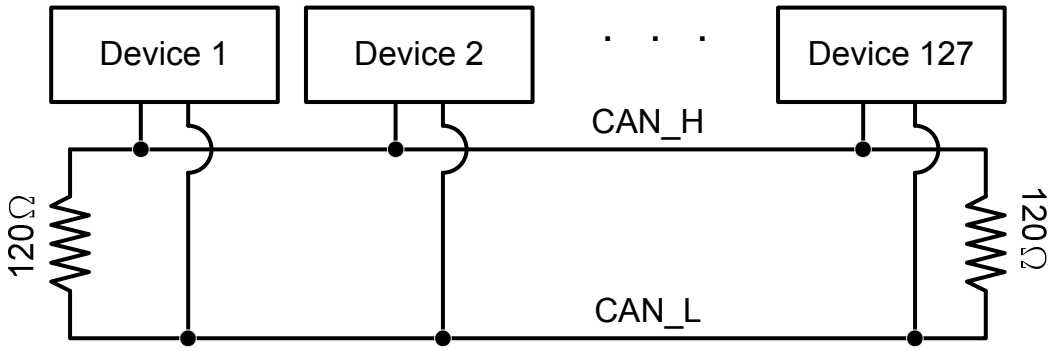


Figure6. Terminator resistor

Therefore, the i-7531 module supplies two switches for users to connect the terminator resistor or not.

The JP2 of i-7531 is used for adjusting terminal resistor on CAN Port 1, and the JP3 of i-7531 is used for adjusting terminal resistor on CAN Port 2.

Before adjusting terminal resistor of i-7531, user needs to open the cover of i-7531 first. Those locations of JP2 and JP3 are shown as following:

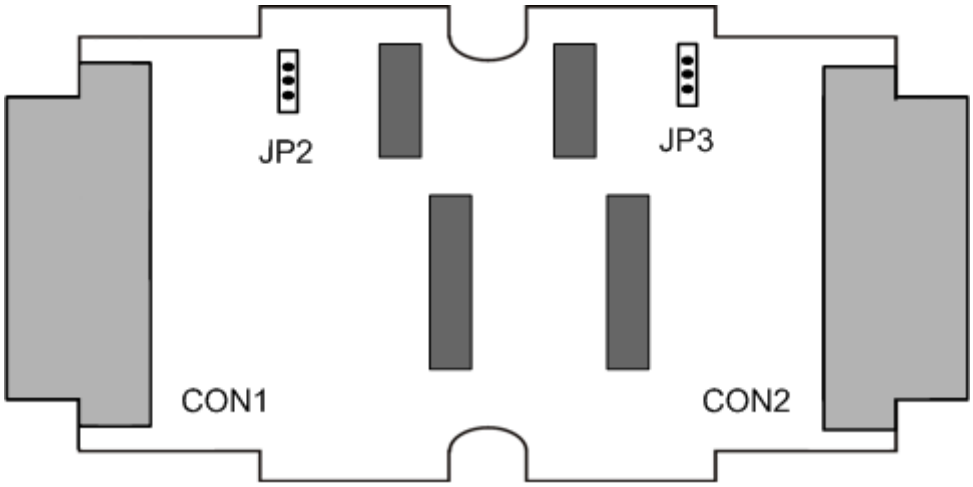


Figure7. JP2 and JP3 positions

The following connection statuses present the condition if the terminal resistor is enabled (default) or disabled.

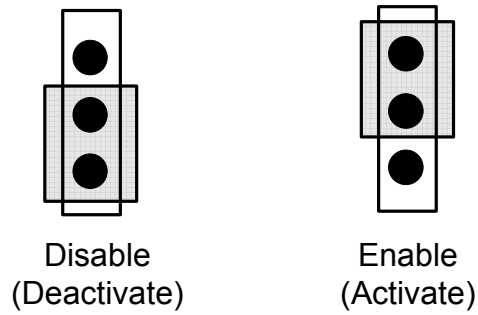


Figure8. Adjustment of terminator resistor

2.7 Cable Selection

The CAN bus is a balanced (differential) 2-wire interface running over either a Shielded Twisted Pair (STP), Un-shielded Twisted Pair (UTP), or Ribbon cable. The wire of CAN_L and CAN_H start on one end of the total CAN network that a terminator resistor of 120 Ohm is connected between CAN_L and CAN_H. The cable is connected from CAN node to CAN node, normally without or with short T connections. On the other end of the cable again a 120Ω (Ohm) terminator resistor is connected between the CAN lines. How to decide a cable type, cable length, and terminator depends on the baud rate in the CAN bus network, please refer to the following table.

Table2. Cable selection

Bus speed	Cable type	Cable resistance/m	Terminator	Bus Length
50k bit/s at 1000m	0.75~0.8mm2 18AWG	70 mOhm	150~300 Ohm	600~1000m
100k bit/s at 500m	0.5~0.6 mm2 20AWG	< 60 mOhm	150~300 Ohm	300~600m
500k bit/s at 100m	0.34~0.6mm2 22AWG, 20AWG	< 40 mOhm	127 Ohm	40~300m
1000k bit/s at 40m	0.25~0.34mm2 23AWG, 22AWG	< 40 mOhm	124 Ohm	0~40m

Note4: The AWG means a standard method used to measure wire. The numbering system works backwards from what people would think, the thicker (heavier) the wire, the lower the number. For example: a 24AWG wire is thicker/heavier than a 26AWG wire.

3 Application Architecture

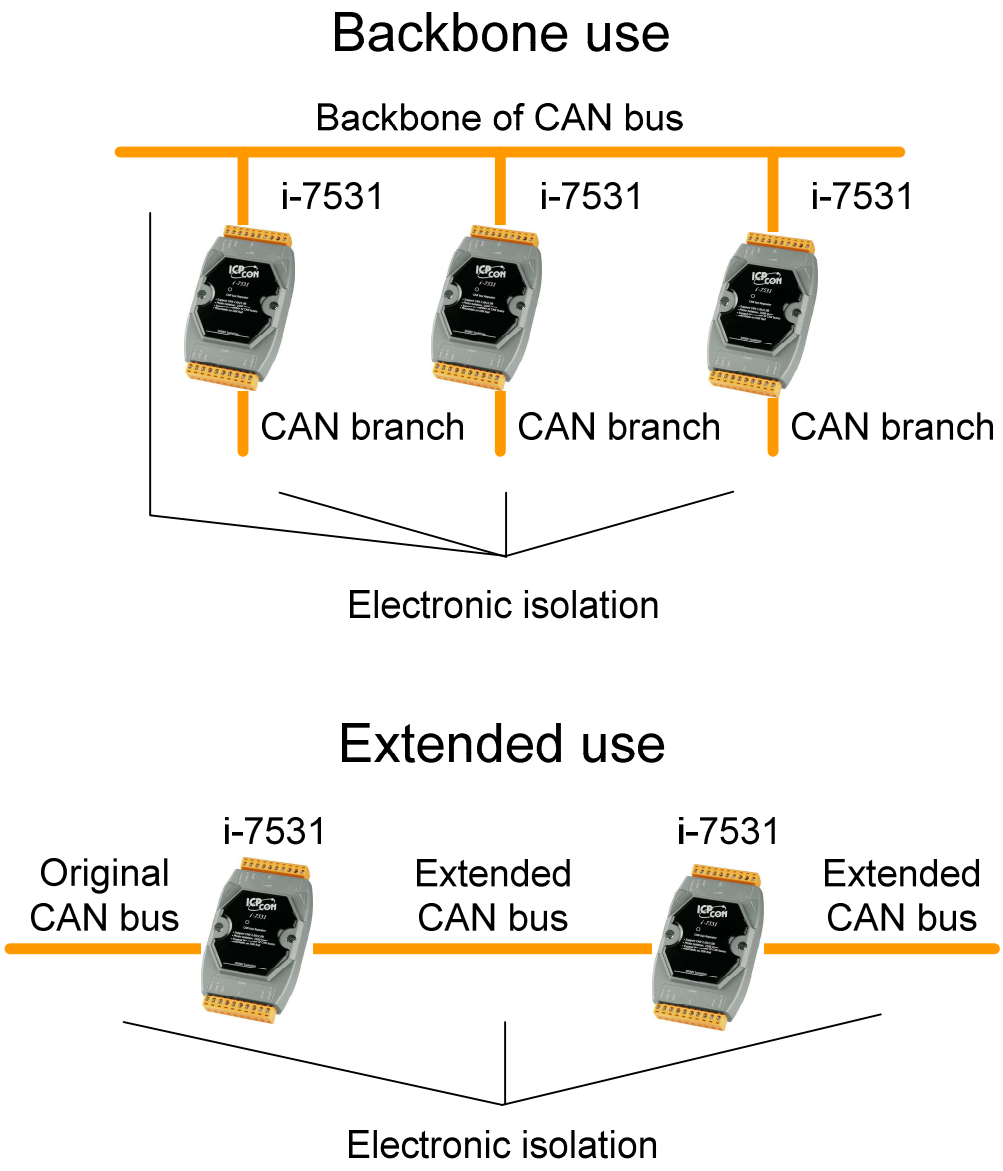
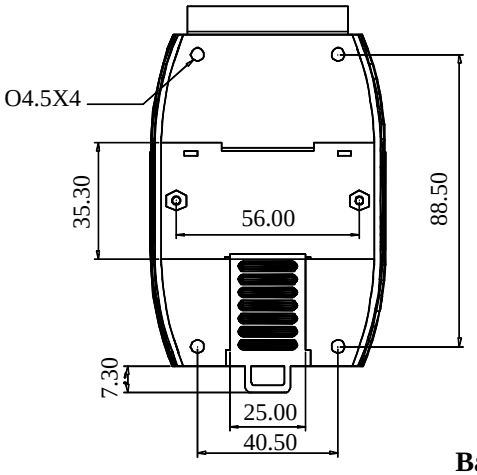
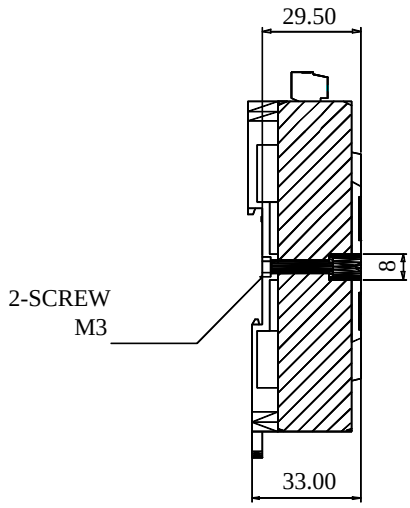


Figure9. Application architecture

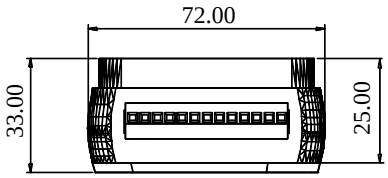
4 Dimension and Mounting



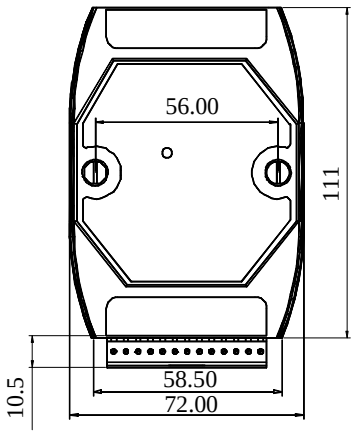
Back View



Side View



Top View



From View

Unit : mm

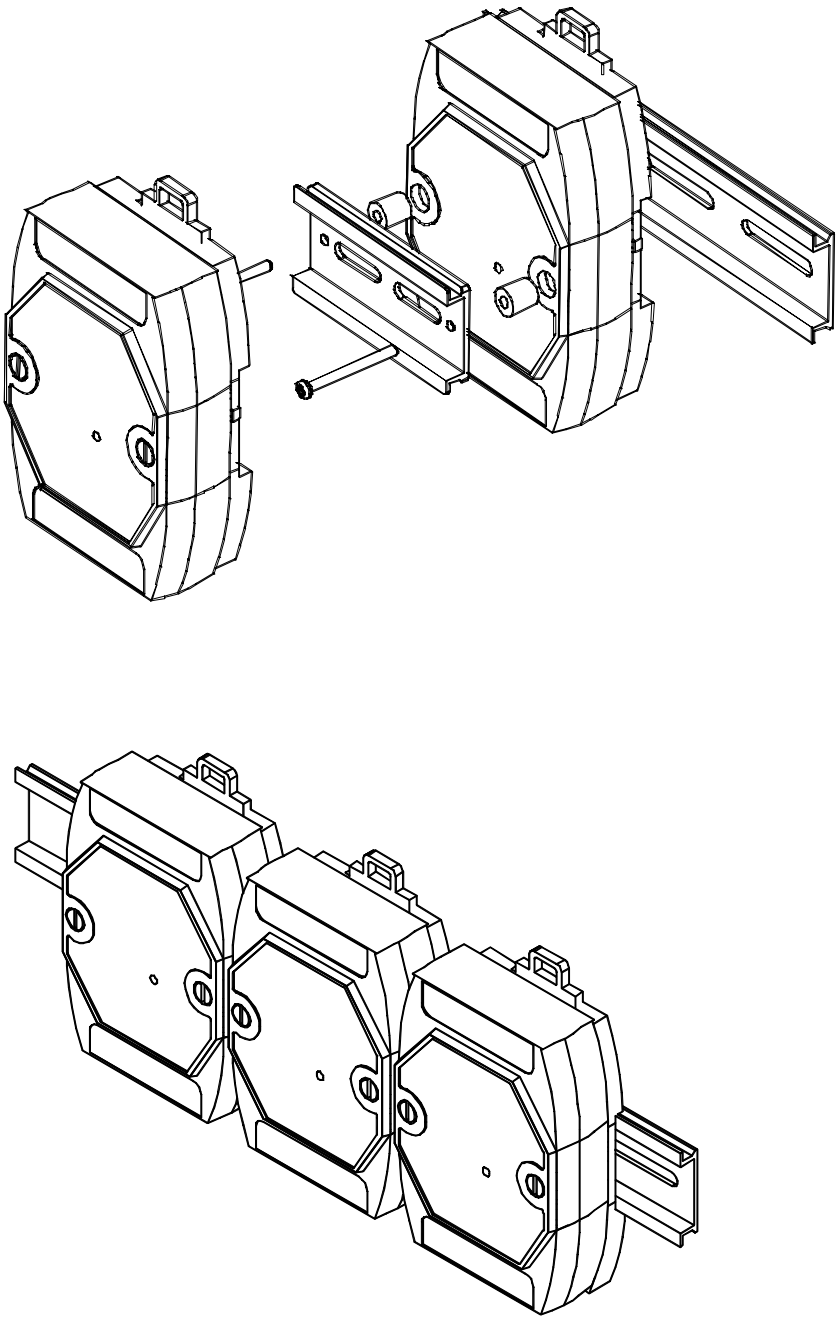


Figure10. Dimension and Mounting